

CLAIMS

What is claimed is:

1. A liquid solder jet apparatus for depositing a stream of liquid solder droplets on selected bond pads of at least one semiconductor die of a substrate having a surface having a plurality of locations of contact pads thereon extending throughout said surface, each location of said plurality of locations on said surface having a start point and an endpoint, comprising:
 - a continuous stream generator for producing a stream of liquid metal solder droplets, said liquid metal solder droplets having a uniform size within a consistent predetermined range, the consistent predetermined range of uniform size metal solder droplets being within the size of the selected bond pads of said at least one of said semiconductor die and said contact pads of said substrate;
 - a stream director for selectively directing said stream of liquid metal solder droplets after being produced by said continuous stream generator onto said selected bond pads of said at least one semiconductor die of said substrate, said stream director comprising a raster scanner scanning said stream of liquid metal solder droplets, said raster scanner including:
 - an electrical charge generator for charging at least a portion of said liquid metal solder droplets of said stream of liquid metal solder droplets with an electrical charge;
 - a stream blanking device for intermittently blanking at least some of said liquid metal solder droplets of said stream of liquid metal solder droplets; and
 - an electrically charged droplet deflector for deflecting at least one electrically charged liquid metal solder droplet of said stream of liquid metal solder droplets in a first direction and a second direction for deposition at a location of said plurality of locations extending throughout said surface of said substrate when said substrate remains stationary;
 - a reservoir for holding liquid metal solder; .
 - a vibrator for causing formation of said stream of liquid metal solder droplets; and

a temperature controller connected to said reservoir for maintaining said liquid metal solder in a liquid state.

2. The apparatus according to claim 1, wherein said continuous stream generator further comprises:

a pressure inducer; and

the vibrator comprises a vibrator connected to said pressure inducer for causing formation of said stream of liquid metal solder droplets in connection with said pressure inducer.

3. The apparatus according to claim 2, wherein said pressure inducer comprises a piezoelectric crystal operating at a desired frequency.

4. The apparatus according to claim 2, wherein said vibrator comprises a piezoelectric crystal operating at a selected frequency to form liquid metal droplets having a size in the range of micron size droplets of a liquid metal solder.

5. The apparatus according to claim 1, wherein said continuous stream generator further includes a solder jet nozzle having an aperture producing a consistent range of droplets of said liquid metal solder for forming said stream of liquid metal solder droplets.

6. The apparatus according to claim 5, wherein said continuous stream generator further includes a solenoid connected to said solder jet nozzle.

7. The apparatus according to claim 1, wherein said stream blanking device at least provides blanking of said at least some of said stream of liquid metal solder droplets when said stream of liquid metal solder droplets is positioned between said endpoint of a first location of said plurality of locations extending throughout said surface of said substrate and said start point of a second location of said plurality of locations extending throughout said surface of said substrate.

8. The apparatus according to claim 1, wherein said stream blanking device further comprises:

a deflector field device selectively deflecting at least one droplet of said stream of liquid metal solder droplets; and

a droplet catcher catching said at least one droplet which has been deflected from said stream of liquid metal solder droplets prior to said at least one droplet which has been deflected from said stream of liquid solder droplets being deposited on said at least one bond pad of said at least one semiconductor die of said substrate.

9. The apparatus according to claim 1, wherein said stream director includes a programmable direction controller for determining a direction of said stream of liquid metal solder droplets.